Jim Nelson

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

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11 July 2000

Ms. Betty Andrews
Philip Williams & Associates
770 Tamalpais Drive, Suite 401
Corte Madera, CA 94925
PHONE: 415.945.0600
FAX: 415.945.0606

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SUBJECT: Los Capitancillos: Freshwater Wetland Mitigation-Soils Report

Dear Ms. Andrews:

We have finished our assessment of the soils at Los Capitancillos regarding the potential suitability for wetland habitat restoration. This work is part of our contract regarding freshwater wetland mitigation design at the site. This letter report specifically addresses several key soil characteristics to be considered during restoration design.

The Los Capitancillos wetland mitigation site is located in southwestern San Jose situated between Guadalupe Creek and Coleman Road. The creek receives controlled releases of water from Guadalupe Reservoir situated approximately 4.5 miles upstream from the site.

According to the *Soils of Santa Clara County* (Soil Conservation Service 1968) the study area is underlain by two different soil series, Pleasanton and Yolo. A third soil type, Garretson, occurs directly adjacent to the property. Several key characteristics of these soils are summarized below in Table 1 (complete descriptions of these soils, taken from the county soils report, is provided in Appendix A). None of these soils appears on the hydric soil lists maintained by the SCS (1988).

Table 1. Key Characteristics of Soils Described by the *Soil Conservation Service (1968).

Soil series/phase	Texture/Parent Material/Substratum	Subsoil Permeability	Taxonomy subgroup/order	Fertility
Pleasanton gravelly loam, 0 to 2 percent slopes	Moderately-fine textured; gravelly sandy clay loam over old gravelly alluvium	Moderately slow	Mollic haploxeralf; alfisol	Moderate
Yolo silty clay loam, 0 to 2 percent slopes	Medium and moderately-fine textured; loamy sedimentary alluvium	Moderately slow	Typic xerorthent; entisol	High
Garretson gravelly loam, 0 to 5 percent slopes	Medium-textured, stratified gravelly loam	Moderately rapid	Typic xerorthent; entisol	Moderate

*Now called Natural Resource Conservation Service (NRCS).

METHODS

Technical Soil Description. Four soil pits were excavated by backhoe on 25 May 2000 by an independent contractor. Pits were dug to an approximate depth of between eight and nine feet. The pits measured approximately four feet by 20 feet. The location of each of these Test Pits, along with geotechnical boring locations, is shown on the aerial photograph of the site provided by the SCVWD (Appendix B). The soil test pit locations were determined by a Global Positioning System.

Several characteristics of soils were determined in the field including horizonal development, texture, color and presence of redoxymorphic features, among other factors. This information was entered in the field onto Soil Test Pits Technical Description Forms. Soil textural classes were determined by the "feel method" in the field. Secondarily, a modified lab method was used on some of the samples to determine soil texture. This method involves suspending a small sample of soil in a dispersing reagent and flocculating agent in order to more quantitatively separate soil fractions into sands, silts and clays. Soil textures for the composite samples were also determined by Soil and Plant Laboratory, Inc.(Santa Clara, CA). Soil textures were reported according to the U.S. Department of Agriculture, SCS (1967) soil classification textural triangle.

Munsell Soil Notations (Munsell Soil Color Charts, Kollmorgen Instr. Corp. 1990) were recorded for the soil matrix for each soil sample. The last digit of the Munsell Soil Notation refers to the chroma of the sample. This notation consists of numbers beginning with 0 for neutral grays and increasing at equal intervals to a maximum of about 20. Chroma values of the soil matrix which are one (1) or less, or of two (2) or less when mottling is present, are typical of soils which have developed under anaerobic conditions. In addition, the Field Indicators of Hydric Soils in the United States, Version 4 (USDA, NRCS 1998) was used in the identification of hydric soil features.

Soil Laboratory Analysis. Two composite soil samples composed of four subsamples (one from each pit) were collected and analyzed for soil nutrients. Composite samples were taken from to potentially suitable soil horizons including a composite sample taken from the A horizon from four to 24 inches, and from the C horizon from four feet to six feet.

RESULTS

Technical Soil Description. For purposes of this study, soil horizons were defined primarily upon distinct differences in texture and color. The horizons for each of the pits were determined to be Ap, A1, C1, C2 and C3 depending upon several soil characteristics defined below.

Ap horizon-defined as the horizon found at the soil surface which has been disturbed from tillage or other mechanical means; the soil structure is characterized as granular resulting from repeated tillage. Soil matrix comprises fine sands, silts and clays, and higher concentrations of organic matter.

A1 horizon-primarily comprises organic matter, fine sands, silts and clays in varying concentrations; some small stones and a small percentage of medium and coarse sands were present; this horizon was distinct from Ap as it was more massive in structure and different from C1 as the percentage of stones and gravels was much less. Generally lower value/lower chroma.

C1 horizon-consists of high percentages of sedimentary alluvium (medium and coarse sands, stones and gravels) affected by pedogenic processes to limited extent, the smaller materials listed above as main components of the A horizon (fine sands, silts and clays) are present but in much smaller concentrations. Generally higher value/higher chroma than the overlying A horizons.

C2 horizon—comprises stratified alluvium (coarse sands, stones and gravels) devoid of fine sands, silts and clays.

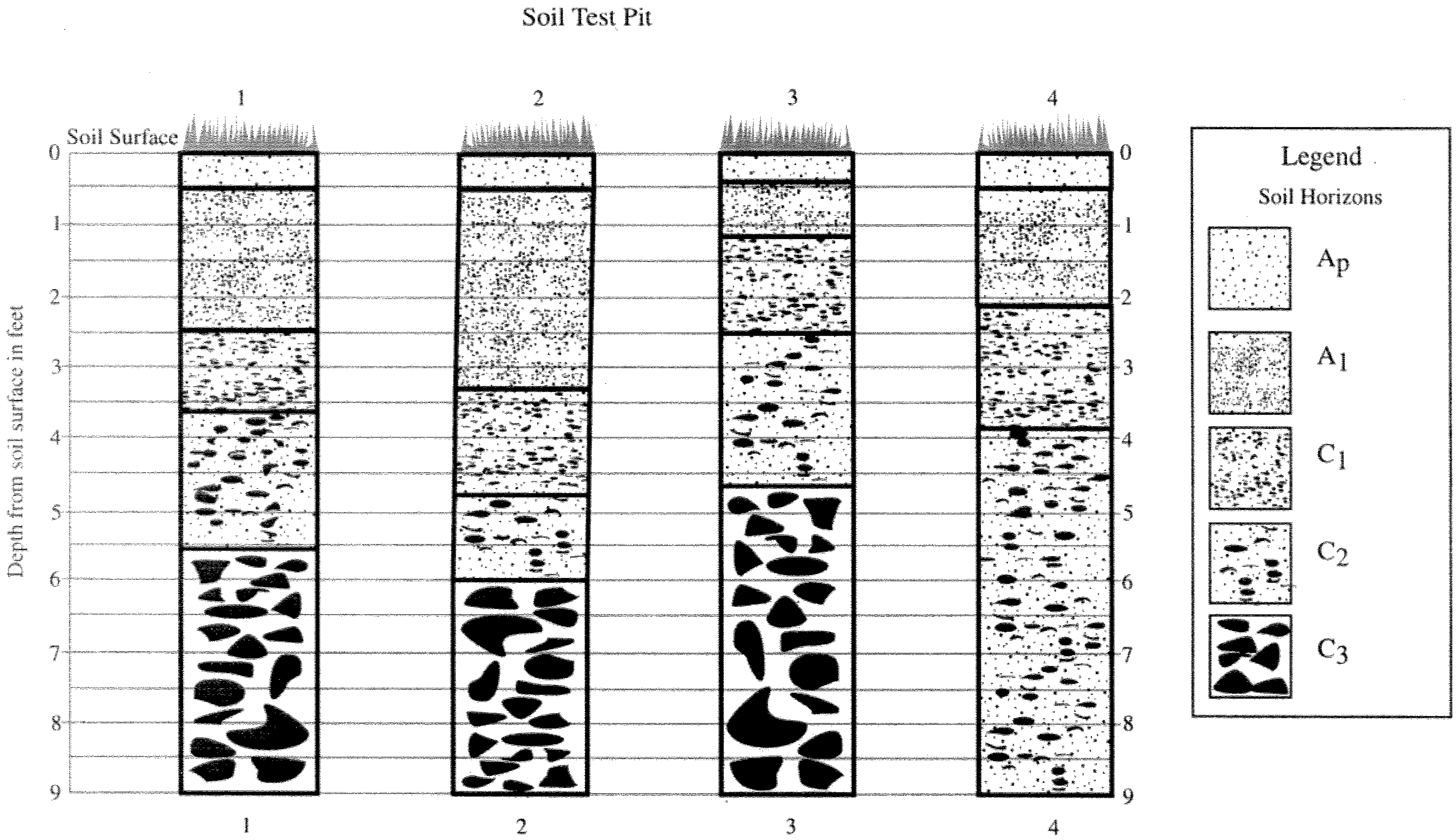
C3 horizon-primarily consisting of large stones (two to 24 inches) and gravels.

Due to tillage in the relatively recent past a distinct, separate O-horizon, dominated by organic matter, undecomposed or partially decomposed litter, was not observed in any of the test pits. Two of the soil phases mapped as occurring on or near the study site are mapped as entisols. These are mineral soils with no or little evidence of development of pedogenic horizons and relatively little organic matter. The historical deposition of alluvial materials from Guadalupe Creek at regular intervals, prior to construction of the Guadalupe Dam, and relatively xeric nature of the site, has slowed soil horizonal development of the soils. As such, horizons were limited to variations of A-horizons (Ap and A1), and C-horizons (C1, C2 and C3). B horizons, which generally have illuvial concentrations of clay, iron, and humus, were not encountered in any soil test pit.

Appendix C presents photographs of each the four sample pits. These photos show a fairly distinct break in soil texture from the clay loam surface horizons to the stratified deposits of stones and gravels, located at varying depths from the surface. Data entered onto the Technical Description Forms are shown in Appendix D. From notes on soil texture a diagram (cross-section) was created showing a soil profile drawing comparison of the four profiles relative to depth of horizon and texture (Figure 1).

The field analysis of soil textures (via the feel method) generally yielded surface soil (A horizons) textures of silty clay loam to clay loams. The modified lab analysis test primarily yielded clay loam soil textures, although sandy clay loams and sandy clay textures were determined. Percent fine sands varied from 33 to 50%; silts from 10 to 27%, and; clays from 33 to 47%. Although silts were a common component of the samples, the threshold for including them as a descriptor of the textural class is greater than 40% per the USDA classification. Similarly, sands must be present at greater than approximately 45% to be a descriptor. The composite soil samples had textures of very gravelly loam (4 to 24 inch sample) and very gravelly, sandy loam (4-6 feet sample).

Soil Test Pit No. 1: This sample pit was located in the western portion of the site (PT-1, Appendix B) approximately 150 feet east of the top-of-bank of Guadalupe Creek. Silty clay loam textures were limited to the upper 22 inches of the soil test pit. Coarser textured soils were observed below this depth (Figure 1, Appendix C). Roots of annual grasses and forbs were restricted to the upper 2 inches of the profile; redoxymorphic features were not observed at any depth. Surface horizons were generally 7.5 YR 3/2 and 7.5 YR 2/2; 7.5 YR 4/4 was determined at 67 inches. Stones up to 12 inches were common in the C2 and C3 horizons. There was a lot of localized fill on this part of the study area including broken imported soil, concrete, brick, asphalt and glass. Profile was relatively dry throughout.



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ECOLOGICAL CONSULTANTS

Los Capitancillos:
Soils Report; Soil Test Pit Profiles

File No. **1700-01**	Date **7/10/00**	Figure **1**

Soil Test Pit No. 2: This sample was located in southeast corner of site (PT-2, Appendix B). Silty clay loam textures were encountered (10 YR 3/2 and 3/3) to approximately 39 inches (Figure 1, Appendix C). Below this point stony loams and stratified sands, gravels and stones predominated (10 YR 3/4). Stones were generally between two and 24 inches in diameter. Soil moisture was not encountered in the profile.

Soil Test Pit No. 3: This sample pit was located in the northeast corner (PT-3, Appendix B) of the study area. The A horizons (Ap and A1) were relatively shallow (to 13 inches) and comprised more coarse-textured material than the previous sample pits (Figure 1, Appendix C). Soils colors did not vary significantly throughout the profile (7.5 YR 3/2, 3/3 and 3/4). Roots were located down to approximately 36 inches and the profile was moist (below field capacity) below this depth. A large sycamore root (approximate diameter four to six inches) was found at 54 inches below the soil surface; presumably from a tree located 100 feet to the north (Appendix B).

Soil Test Pit No. 4: This pit was located in the central portion of the site (PT-4, Appendix B). The A horizons extended down to 25 inches (10 YR 3/3) with stones comprising five to 10 percent of the soil volume. Coarse-textured materials dominated below this depth; a C3 horizon was not encountered down to nine feet. The C2 horizon comprised stones (1-12 inches in diameter) and gravel in an approximately 50:50 mix.

The features observed in each of the soil test pits relative to soil texture, color and other characteristics were closest to features described in the *Soils of Santa Clara County* (Soil Conservation Service 1968) under Yolo silty clay loam, 0 to 2 percent slopes, which presumably underlies most of the site. In contrast, the Pleasanton gravelly loam series described for a portion of the site, which included 15 to 20% gravels in the surface horizon and a well developed B horizons (clay loams and heavy clays) to 66 inches did not match features observed in the field; this soil is an alfisol with much better developed horizons than was encountered on site. Garretson soils are primarily loams with a few percent gravels in the surface horizons. The study area is situated directly adjacent to Guadalupe Creek; the subsoil comprises much larger alluvial materials closer to the soil surface than the typic descriptions provided in the county soil survey.

Soil Laboratory Analysis. Appendix E presents information form the soil lab analysis. The pH of each of the two composite samples was fairly neutral (pH 6.6 for the 4 in to 24 inch sample; pH 6.8 for the 4-6 foot depth sample). The samples taken from closer to the soil surface were higher in plant macro-nutrients (nitrogen, phosphorous, potassium, calcium and magnesium). The concentrations for each of these nutrients is somewhat typical of poor to moderate soil fertility.

DISCUSSION

The purpose of the soil survey work was to assess site soil suitability for wetland habitat restoration. The primary features analyzed to determine this suitability were soil texture and fertility. Overall, the soil test pits were fairly similar in their stratification of soil horizons although they varied somewhat in the total depth of each of the A and C horizons. The trend was for deeper A horizons (Ap and A1) at the south/southwest end of the site, and shallower and coarser textured soils in the north/northeast corner of the study area.

As currently proposed, a portion of the proposed restoration site would comprise an open water habitat excavated to a depth which would preclude establishment of emergent wetland vegetation. This area would serve to provide habitat for wildlife species that utilize open water while providing a secondary benefit of percolating water into the shallow groundwater aquifer. Adjacent to the open water component would be an emergent wetland fringe with a minor riparian zone. Each of these design elements requires different site physical characteristics in order to function successfully. An open, loose-textured soil such as that encountered in all of the C horizons described in this report is ideal for percolation. For emergent wetland vegetation, a moderately dense soil texture (loam to clay loam to lighter clays) of moderate fertility is desired; the A horizons found on site represent a suitable growing medium. The more deeply rooted riparian trees and shrubs, generally adapted to lower soil fertility associated with alluvial deposits, would be expected to grow well on the native soils (i.e. A/C horizons).

The results from the four soil sample pits analyzed for this report were fairly consistent with information presented by Jones & Stokes Associates (JSA) in 1999. They excavated and characterized three soil sample pits within the Los Capitancillos proposed wetland mitigation area. These samples were described as deep groundwater phase map units (S1, S2 and S3). The JSA description included a 0-30 inch horizon: loam to clay loam (<15% coarse fragment) and a 30-120 inch layer: sandy loam to loamy sand (35-85% coarse fragments). They noted that groundwater occurred at depths greater than eight feet from the soil surface.

The results indicate that the topsoil texture and fertility characteristics would be suitable for the establishment of native wetland and riparian vegetation without the need for amendments. Therefore, we recommend that the design call for harvesting and stockpiling of the topsoil from 4-18 inches depth. The upper 4 inches of topsoil should be discarded to diminish the weed seed bank on the site. The mitigation site should then be over-excavated and the stockpiled topsoil spread across the wetland and riparian habitat established areas of the site. The preferred depth of this layer within the wetland/riparian planting zone should be at least 12 to 18 inches in depth.

If soils from the Los Capitancillos site are ultimately determined to be unsuitable for other reasons (e.g. mercury contamination), imported soil should target a soil texture between clay loam to clay with less than 70% total clays, the difference made up of a combination of sands and silts (to 30%).

The existing C horizons are currently unsuitable for wetland/riparian plantings by themselves as they are very coarse textured comprising almost entirely coarse sands, gravels and stones of varying sizes. This layer contains virtually no organic matter, and very little fine-textured soil components (clays and silts) which are the primary sources of soil-bound macro- and micro-nutrients bound in the soil. Planting in such a medium would restrict plants to obtaining nutrients primarily from the soil water, which is relatively low in such nutrients and only includes those that are water soluble. As noted above, a separate A horizon (comprising loams and clay loams) in combination with the C horizons are ideal for these plantings.

If you or your staff have any questions please feel free to contact me at (408) 448-9450 ext. 301 or our project manager, Pat Reynolds, at extension 405.

Sincerely,

Pat Reynolds for

Patrick J. Boursier, Ph.D.
Principal, Botany and Wetlands Division

LITERATURE CITED

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Soil Conservation Service. 1968. Soils of Santa Clara County, California. USDA

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APPENDIX A

LOS CAPITANCILLOS:
FRESHWATER WETLAND MITIGATION

SCS Soils Information

GARRETSON SERIES

The Garretson series consists of well drained, medium textured soils, underlain by sedimentary alluvium. These soils formed on nearly level to gently sloping first bottom positions along the larger drainageways. Vegetation is annual grasses and forbs, with a few scattered oak trees. Elevations range from 200 to 2,000 feet. Mean annual rainfall is 16 to 25 inches; mean annual air temperature is 58 to 60° F. The growing season is about 250 to 300 days. Esparto, Yolo and Zamora are the principal associated soils.

The surface soil ranges in thickness from 16 to 28 inches, and is a grayish brown neutral loam, gravelly loam or fine sandy loam. The subsoil is a brown, neutral, very fine sandy loam or loam, averaging 20 to 32 inches in thickness. The substratum is stratified, ranging from gravelly loam to sand and gravel.

Garretson soils are used for irrigated orchards, dryland grain hay and pasture.

Garretson loam, gravel substratum, 0 to 2 percent slopes (GaA). This soil occurs on first bottom positions, along the larger drainageways. The slopes usually average less than 2 percent.

Representative profile: In a walnut orchard, 6/10 of a mile south of Coyote and 50 feet north off farm road and 2/10 of a mile east off highway 101; Santa Clara County, California.

Ap	0 to 6 inches, grayish brown (10YR 5/2) loam, about 3 to 5 percent gravel, very dark grayish brown (10YR 3/2) when moist; massive; hard, friable, nonsticky and nonplastic; neutral (pH 7.0); clear smooth boundary. (4 to 10 inches thick).
A11	6 to 19 inches, grayish brown (10YR 5/2) loam, about 2 to 3 percent medium and fine gravel, very dark grayish brown (10YR 3/2) moist; massive; hard, friable, nonsticky and nonplastic; many very fine, few medium tubular pores; neutral (pH 7.0); clear smooth boundary. (12 to 18 inches thick).
C1	19 to 40 inches, brown (10YR 5/3) very fine sandy loam, dark brown (10YR 4/3) moist; massive; hard, friable, nonsticky and nonplastic; neutral (pH 7.0); clear smooth boundary. (20 to 32 inches thick).
IIC2	40 to 60 inches, stratified sands and gravels.

Surface soil colors may be brown or grayish brown. Reaction in the surface and subsoil may be slightly acid, neutral or moderately alkaline. Structure is massive and the texture is typically a loam but may be clay loam. Subsoil colors are brown,pale brown or yellowish brown. Texture may be very fine sandy loam, or gravelly loam. Clay content of the subsoil will average between 18 and 35 percent. The substratum at depths of 36 to 60 inches is stratified sand and gravel. A few areas may be calcareous below 36 inches.

Included in mapping this soil are areas of Cortina very gravelly loam 15 percent, and a few areas of sand and gravel substratum within 20 inches of the surface.

This well drained soil holds about 5 to 7 inches of water for plant use. Subsoil permeability is moderate and runoff is very slow. Erosion hazard is not a problem. Fertility is moderate. Depth of rooting zone is deep but may be somewhat restricted by the sand and gravel substratum.

This soil is used for irrigated prunes, walnuts and dryland hay and pasture. Capability unit IIs4 (14) and IIIcl (15).

Garretson gravelly loam, 0 to 5 percent slopes (GbB). This soil occurs on nearly level to gentle slopes, averaging 2 to 4 percent. The texture is a gravelly loam or gravelly clay loam. Subsoil and substratum is usually stratified but the same texture as the surface; the sand or gravel strata is missing. Subsoil permeability is moderately rapid and the soil holds 7 to 8 inches of water plants can use. Favorable rooting depth is very deep; runoff is slow; erosion hazard is slight. Otherwise, this soil is similar to Garretson loam, gravel substratum, 0 to 2 percent slopes. Included in mapping are slopes that range up to 9 percent, and similar soils with dark grayish brown granular surface, formed on basic igneous rock alluvium.

This soil is used for irrigated prunes, apricots, walnuts and dryland hay or pasture. There is enough gravel present in the surface soil to interfere slightly with tillage operations. Capability unit IIs4 (14) and IIIcl (15).

Garretson fine sandy loam, 0 to 2 percent slopes (GpA). This soil is nearly level, with an average slope less than 2 percent. Texture is a fine sandy loam. Subsoil and substratum is stratified and the texture may be fine sandy loam, gravelly loam or sandy loam; the sand and gravel strata is missing. This soil holds 8 to 9 inches of water plants can use. Favorable rooting depth is very deep. Otherwise, it is similar to Garretson loam, gravel substratum, 0 to 2 percent slopes. Included in mapping are areas of gravelly loam texture and similar soils with mottled subsoils.

This soil is used for irrigated prunes, apricots, walnuts, dryland hay and pasture. Capability unit I-1 (14).

This land type is used for wildlife and recreation. A few areas are used by the city and county for dumping trash and other materials. Capability unit VIIIw4 (14).

PLEASANTON SERIES

The Pleasanton series consists of well drained soils, having moderately fine textured subsoils, underlain by old gravelly sedimentary alluvium. These soils formed on nearly level to moderately steep fans and terraces. Vegetation is chiefly annual grasses and forbs with scattered oak trees. Elevations range from 200 to 1,000 feet. Mean annual rainfall is 16 to 20 inches; mean annual air temperature is 58 to 60° F. The growing season is about 260 to 300 days. Hillgate and Arbuckle are the principal associated soils.

The surface soil averages 12 to 20 inches in thickness and is a grayish brown, slightly acid loam or gravelly loam. Subsoil is dark grayish brown and neutral gravelly clay loam, ranging from 24 to 30 inches in thickness. The substratum is neutral, yellowish brown, sandy clay loam over gravelly alluvial material extending to an undetermined depth.

Pleasanton soils are used for irrigated row crops, orchards, vineyards and dryland hay, pasture and range. They are also used for housing and commercial developments.

Pleasanton loam, 0 to 2 percent slopes (PoA). This soil occurs on nearly level old fans.

Representative profile: About 10 feet off north side of road on Dryden Avenue, 700 feet east of New Avenue; Santa Clara County, California.

Ap 0 to 5 inches, grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine interstitial and common very fine tubular pores; slightly acid (pH 6.5); abrupt smooth boundary. (0 to 6 inches thick).

A12 5 to 18 inches, grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine and medium roots; many very fine interstitial, common fine tubular and a few medium tubular pores; slightly acid (pH 6.5); clear wavy boundary. (12 to 14 inches).

B1t 18 to 23 inches, dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; massive; hard, friable, slightly sticky and slightly plastic; few medium roots; many very fine interstitial and tubular pores; common thin clay films lining pores and on ped faces;

neutral (pH 7.0); clear smooth boundary. (4 to 6 inches thick).

B2t 23 to 44 inches, brown (10YR 5/3) gravelly heavy clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; very hard, friable, sticky and plastic; few very fine roots; many very fine and fine, few medium tubular pores; many moderately thick clay films on ped faces and lining pores; neutral (pH 7.0); clear smooth boundary. (20 to 24 inches thick).

B3t 44 to 66 inches, yellowish brown (10YR 5/4) gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, sticky and plastic; few medium roots; many very fine, fine interstitial and tubular, also a few medium tubular pores; common thin clay films in pores and on ped faces; neutral (pH 7.0).

The surface soil color is brown or grayish brown and occasionally dark grayish brown. Texture is typically loam but will range to a light clay loam with some medium and fine gravel, ranging from 3 to 5 percent by volume. Reaction is slightly acid to neutral and changes little with depth. Subsoil color is brown, dark grayish brown or yellowish brown. Texture is a gravelly clay loam or gravelly sandy clay loam. The substratum is lighter colored and more yellowish than the subsoil. Lime is occasionally present in the substratum.

Included in mapping this soil are 5 percent areas of San Ysidro loam; 5 percent Hillgate silt loam; and a few areas of soils similar to Pleasanton loam that have medium acid subsoils, 5 percent. The included soils are only moderately deep to a clay subsoil which may cause irrigation management problems.

This well drained soil is moderately fertile, and average water holding capacity is about 8 to 9 inches. Subsoil permeability is moderately slow. Surface runoff is very slow and erosion is not a problem. Favorable rooting depth is very deep but is somewhat restricted by the moderately fine textured subsoil.

This soil is used for irrigated row crops, apricots, prunes, walnuts, grapes, dryland grain hay and pasture. Large areas are also used for housing and commercial developments. Capability unit I-3 (14).

Pleasanton loam, 2 to 9 percent slopes (PoC). This soil occurs as small to moderately sized areas on slightly older alluvial fans. Average slope ranges from 3 to 5 percent. Runoff is slow to medium and erosion hazard is slight to moderate. Otherwise, this soil is similar to Pleasanton loam, 0 to 2 percent slopes. Included in mapping are areas of moderate sheet erosion.

This soil is used for irrigated prunes, apricots, grapes, walnuts, dryland hay and pasture. Large areas of this soil are also used for housing and commercial development. Capability unit IIel (14).

Pleasanton gravelly loam, 0 to 2 percent slopes (PpA). Except for being a gravelly loam on the surface, this soil is similar to Pleasanton loam, 0 to 2 percent slopes. The average percent of gravel ranges from 15 to 20 percent by volume. It holds about 5 to 7 inches of water plants can use. Included in mapping are areas of Cropley clay 10 percent; and 5 percent San Ysidro loam.

This soil is used for irrigated apricots, prunes, walnuts, grapes, dryland hay and pasture. It is also used for housing and commercial development. There is usually enough gravel on the surface to interfere slightly with tillage operations. Capability unit IIs4 (14).

Pleasanton gravelly loam, 2 to 9 percent slopes (PpC). This soil occurs as small to moderate sized areas at the upper part of the slightly older alluvial fans. Average slope is 3 to 5 percent. Texture is a gravelly loam on the surface; the gravel ranges from 15 to 25 percent by volume. Average water holding capacity is about 5 to 7 inches. Runoff is slow to medium and erosion hazard is slight to moderate. Otherwise, this soil is similar to Pleasanton loam, 0 to 2 percent slopes. Included in mapping, are small areas of Cropley clay 5 percent; 5 percent Hillgate silt loam, and 5 percent Yolo gravelly loam.

Except for areas in the small upland valleys, most of this soil is cultivated. It is used for irrigated prunes, apricots, grapes, dryland hay and pasture. There is generally enough gravel to interfere slightly with tillage operations. Capability unit IIIe4 (14).

Pleasanton gravelly loam, 9 to 15 percent slopes, eroded (PpD2). This soil occurs as small areas on strongly sloping terraces. Average slope is 12 percent. Texture is gravelly loam and the gravel ranges from 15 to 25 percent by volume. The average water holding capacity is about 5 to 7 inches. Runoff is medium, erosion hazard is moderate. Otherwise, this soil is similar to Pleasanton loam, 0 to 2 percent slopes. Included in mapping are small areas of 10 percent Hillgate silt loam; and areas of severe sheet erosion.

This soil is used for dryland hay, pasture and range. There is generally enough gravel to interfere slightly with tillage operations. Capability unit IVel (15); pasture and range site Loamy.

Pleasanton gravelly loam, 15 to 30 percent slopes, eroded (PpE2). This soil occurs as small areas on moderately steep terraces, facing toward deeply entrenched stream channels. The average slope is 20 percent. Texture is gravelly loam and the gravel ranges from 15 to 20 percent by volume. Average water holding capacity is about 5 to 7 inches. Runoff is rapid, and erosion hazard is high. Past sheet and gully erosion is moderate to severe. Otherwise, this soil is similar to Pleasanton loam, 0 to 2 percent slopes. Included in mapping are 10 percent areas of Positas loam; and 5 percent Saratoga loam.

This soil is used for dryland pasture and range. Capability unit VIe1 (15); pasture and range site Loamy.

POSITAS SERIES

The Positas series consists of well drained soils, having claypan like subsoils, underlain by old mixed alluvium. They formed on strongly sloping to moderately steep terraces. Vegetation is grasses, forbs and scattered oak trees. Elevations range from 200 to 2,000 feet. Mean annual rainfall is 16 to 20 inches; mean annual air temperature is 58 to 60° F. The growing season is 250 to 300 days. Pleasanton, San Ysidro and Azule are the principal associated soils.

The surface soil ranges from 10 to 25 inches in thickness and is a brown, medium acid loam. The subsoil is a reddish brown, medium acid clay ranging from 14 to 20 inches thick in the upper part, and yellowish brown, slightly acid clay loam, 8 to 15 inches thick in the lower part.

Positas soils are used for irrigated apricots, prunes, grapes, dryland hay and pasture. Some areas are used for housing and commercial developments.

Positas-Saratoga loams, 9 to 15 percent slopes (PrD). This complex consists of soils which are intermixed and it was not feasible to map them separately. They occur on strongly sloping terraces with an average slope of 12 percent.

A representative profile of Positas loam follows, and the profile for Saratoga loam is described under the respective series.

Representative Positas profile: 50 yards east of Almaden road, 1/2 mile south of McKean Road; Santa Clara County, California.

AP 0 to 7 inches, brown (10YR 5/3) loam, dark brown (7.5YR 3/2) moist; massive; hard, friable, nonsticky and nonplastic; few fine roots; many very fine tubular pores; medium acid (pH 6.0); clear smooth boundary. (5 to 8 inches thick).

A12 7 to 16 inches, brown (10YR 5/3) loam, dark brown (7.5YR 3/2) moist; massive; hard, friable, nonsticky and nonplastic; few fine roots; many very fine tubular pores; medium acid (pH 6.0); abrupt smooth boundary. (5 to 17 inches thick).

alkaline (pH 8.5); clear smooth boundary. (18 to 25 inches thick).

Cca 31 to 60 inches, light olive gray (5Y 6/2) clay, olive gray (5Y 5/2) moist, common fine distinct mottles brown (10YR 5/3) dry and dark brown (10YR 4/3) moist, and a few distinct mottles gray (5Y 6/1) dry and gray (5Y 5/1) moist; massive; very hard, firm, sticky and plastic; many very fine interstitial, tubular and a few medium tubular pores; many intersecting slickensides in the upper 10 inches; strongly effervescent, disseminated lime; strongly alkaline (pH 8.5).

Surface soil color may be dark gray or dark grayish brown. Reaction is moderately alkaline; lime is usually present in the lower surface. Few to many medium sized salt crystals are commonly found in the lower surface soil or subsoil. Texture is typically clay. When this soil is dry, deep cracks develop, averaging 1/2 to 1 1/2 inches in width. Color of the subsoil is olive gray, light olive gray or light yellowish brown. Distinct mottles start at an average depth of 12 inches and the colors are light brownish gray or brown and are gray in the lower subsoil.

Included in mapping this soil are areas of 15 percent Clear Lake clay; and a few areas of gentle slopes. About 20 percent of this acreage is covered by sandy clay loam textured overwash material 10 to 20 inches in thickness.

This poorly drained soil has a water table that fluctuates seasonally within 20 to 40 inches. Fertility is affected by moderate concentrations of neutral salts. It usually becomes ponded during winter months and erosion is not a problem. Subsoil permeability is slow and the average water holding capacity is about 4 to 7 inches. Rooting depth is usually restricted by the water table.

This soil is used for limited irrigated row crops and pasture. Salt tolerant grasses and forbs are the main pasture plants. Capability unit IVw6 (14).

Willows clay, slightly alkali (Wb). This soil has only slight concentrations of salts and salt tolerant plants are not usually affected. The water table is below 60 inches because natural drainage has improved with general lowering of the ground water level in the valley. Otherwise, this soil is similar to Willows clay. Included in mapping are areas of 10 percent Orestimba clay; 5 percent Sunnyvale silty clay; and areas with moderate to strong salt concentrations.

This soil is used for irrigated row crops, sugar beets, pears, and dryland grain hay and pasture. A few areas have been used for housing developments. Capability unit IIIw5 (14).

YOLO SERIES

The Yolo series consists of well drained, medium and moderately fine textured soils, underlain by sedimentary alluvium. They formed on nearly level to moderately sloping alluvial plains and fans. Vegetation is annual grasses and forbs, with a few scattered oak trees. Elevations range from 400 to 2,400 feet. Mean annual rainfall is 15 to 25 inches; mean annual air temperature is 58 to 60° F. The growing season is about 250 to 325 days. Zamora, Campbell and Esparto are the principal associated soils.

The surface soil ranges in thickness from 26 to 32 inches and is a grayish brown, neutral and mildly alkaline loam or silty clay loam. The subsoil and substratum are a brown, mildly alkaline silt loam or silty clay loam and extends to a depth of 60 inches or more.

Yolo soils are used for irrigated row crops, sugar beets, orchards, vineyards, dryland hay and pasture. Large areas are used for housing and commercial developments. These are the most productive soils in the Santa Clara Valley.

Yolo loam, 0 to 2 percent slopes (YaA). This soil occurs on nearly level alluvial plains and fans. Flooding is not usually a hazard except for a few low areas along drainageways, that may be flooded once in 20 years.

Representative profile: In a field 20 feet east of San Antonio Creek, 1/4 of a mile north of Harney School, in the San Antonio Valley in the Northwest corner of the N. W. 1/4 of the N. E. 1/4 of Sec. 1, T. 7 S., R. 4 E., Santa Clara County, California.

Ap	0 to 7 inches, grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; cloddy; hard, friable, nonsticky and nonplastic; abundant very fine roots; many very fine interstitial pores; neutral (pH 6.6); clear smooth boundary. (6 to 8 inches thick).
A12	7 to 29 inches, grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; massive; hard, friable, nonsticky and nonplastic; plentiful very fine roots; many very fine interstitial and tubular, also a few fine and medium tubular pores; mildly alkaline (pH 7.5); clear smooth boundary. (20 to 24 inches thick).
C	29 to 60 inches, brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; massive; hard, friable, nonsticky and nonplastic; few very fine roots. many very fine interstitial, tubular and a few medium and fine tubular pores; mildly alkaline (pH 7.5).

Surface soil color may be grayish brown or brown. Reaction is mildly alkaline to slightly acid. Texture is typically a loam, but may be silt loam or light clay loam. The subsoil color is brown, yellowish brown or light yellowish brown. Reaction is neutral to mildly alkaline. Texture is stratified silt loam, silty clay loam, clay loam, loam, sandy loam, and in places may be gravelly. Average texture from 10 to 40 inches deep, is a silty loam or silty clay loam; lime may be present in a few places in the substratum, below 40 inches.

Included in mapping this soil are areas of similar soil that is pale brown on the surface; and areas of Zamora clay loam.

This well drained soil holds about 9 to 10 inches of water for plant use. Fertility is high. Runoff is very slow and erosion is not a problem. Subsoil permeability is moderate and the effective rooting depth is very deep.

This soil is used mainly for irrigated row crops, sugar beets, prunes, apricots, walnuts, pears, dryland hay and pasture. Crop production is high to very high. About 50 percent of this soil is used for housing and commercial developments. Capability unit I-1 (14, or IIIcl (15); pasture and range site, Loamy.

Yolo loam, 2 to 5 percent slopes (YaB). Except for occurring as small to moderate sized, gently sloping areas, this soil is similar to Yolo loam, 0 to 2 percent slopes. Texture is a loam or light clay loam. Erosion hazard is slight and runoff is slow. Included in mapping are bodies of gravelly soils; and, slopes ranging up to 9 percent.

This soil is used mainly for irrigated row crops, sugar beets, prunes, apricots, walnuts, dryland hay and pasture. Capability unit IIel (14), or IIIel (15); pasture and range site Loamy.

Yolo silty clay loam, 0 to 2 percent slopes (YeA). This soil occupies nearly level alluvial plains of the Santa Clara Valley. Surface soil texture is a silty clay loam or clay loam. Runoff is very slow and erosion is not a problem. Average water holding capacity is about 10 to 11 inches. Subsoil permeability is moderately slow. Otherwise, this soil is similar to Yolo loam, 0 to 2 percent slopes. Included in mapping are small bodies of gravelly soils; narrow areas of slope breaks; and Campbell silty clay loam.

This soil is used for irrigated row crops, sugar beets, prunes, apricots, walnuts, pears, grapes, and dryland hay and pasture. About 50 percent of this soil is used for housing and commercial developments. Capability unit I-1 (14).

Yolo silty clay loam, 2 to 9 percent slopes (YeC). This soil occupies gently to moderately sloping alluvial fans, with an average slope of 5 percent. Surface soil texture is a silty clay loam or clay loam. Runoff is slow to medium and erosion hazard is slight to moderate. Average water holding capacity is about 10 to 11 inches and permeability is moderately slow.

Otherwise, this soil is similar to Yolo loam, 0 to 2 percent slopes. Included in mapping are 10 percent areas of Garretson gravelly loam; and 5 percent Pleasanton gravelly loam.

This soil is used for irrigated row crops, sugar beets, prunes, apricots, walnuts, pears, grapes and dryland pasture. About 30 percent of this soil is used for housing and commercial developments. Capability unit IIe5 (14).

ZAMORA SERIES

The Zamora series consists of well drained soils having moderately fine textured subsoils, underlain by alluvium of mixed origin. They are formed on nearly level to moderately sloping alluvial fans. Vegetation is chiefly annual grasses and forbs, with scattered oak trees. Elevations range from 200 to 1,000 feet. Mean annual rainfall is 16 to 20 inches; mean annual air temperature is 58 to 60° F. and the growing season is about 250 to 300 days. Pleasanton and Yolo are the principal associated soils.

The surface soil averages 12 to 20 inches in thickness and is a dark grayish brown, neutral loam or clay loam. The subsoil is a dark brown or brown, neutral clay loam, ranging from 20 to 30 inches in thickness. The substratum is stratified, gravelly, sandy clay loam and fine sandy clay loam alluvium.

Zamora soils are used for irrigated row crops, orchards, vineyards, dryland hay and pasture. A few areas are used for housing and commercial developments.

Zamora clay loam, 0 to 2 percent slopes (ZbA). This soil occurs as nearly level fans in the Paradise Valley area and as smaller bodies throughout the survey area. Average slope is less than 2 percent.

Representative profile: In a prune orchard just about 30 feet southwest of the intersection of Bowden Avenue and Watsonville Road; Santa Clara County, California.

Ap 0 to 7 inches, dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; cloddy; hard, friable, sticky and plastic; few very fine roots; many very fine interstitial pores; neutral (pH 7.0); abrupt smooth boundary. (6 to 8 inches thick).

A12 7 to 15 inches, dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; massive; friable, sticky and plastic; few very fine and medium roots; neutral (pH 7.0); clear smooth boundary. (6 to 12 inches thick).

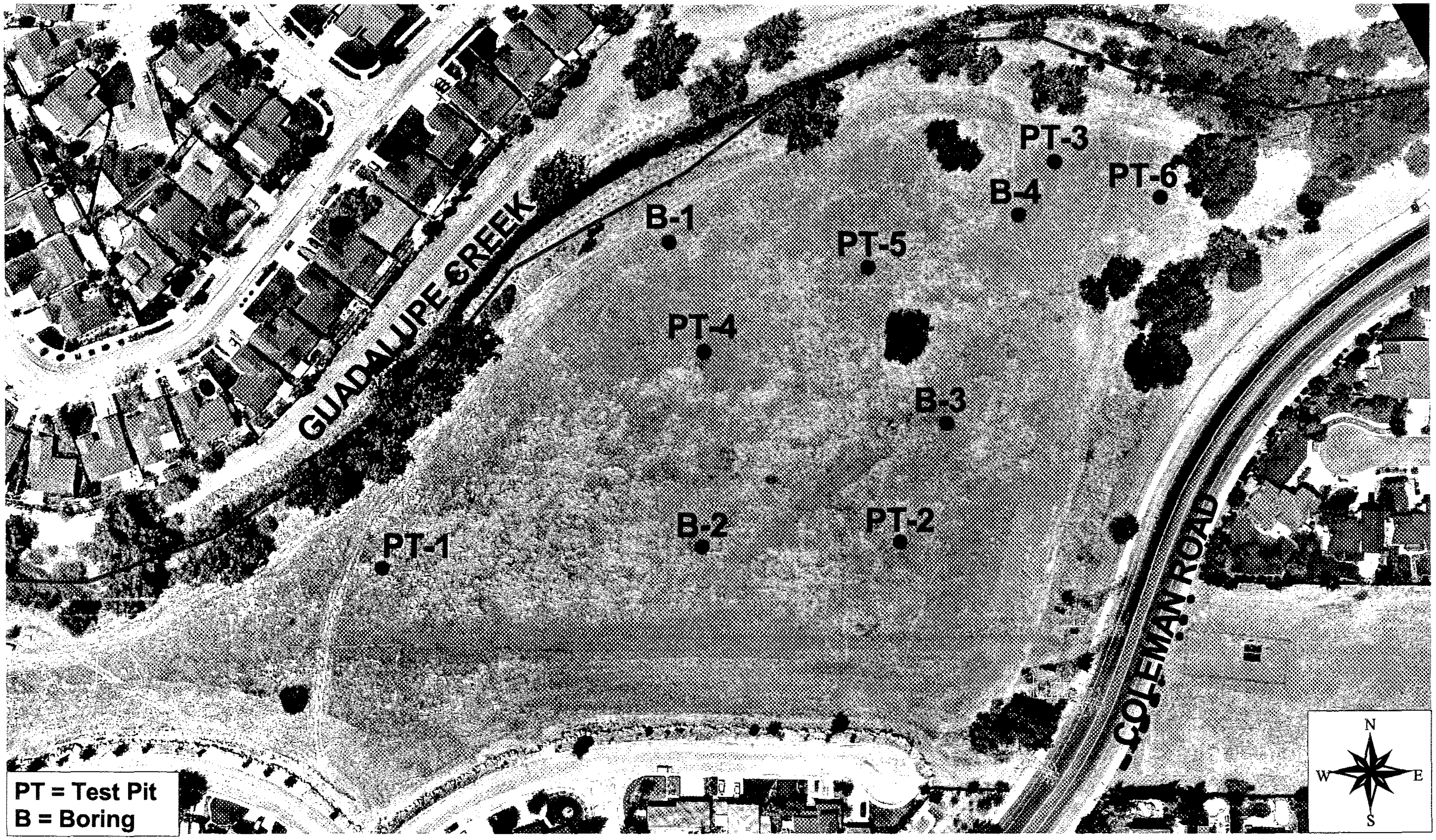
B21t 15 to 26 inches, dark brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate, medium subangular blocky

APPENDIX B

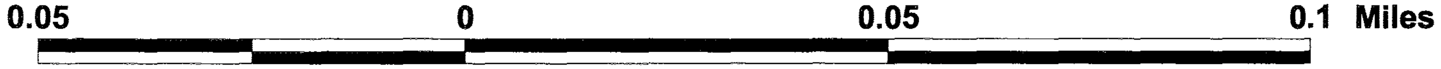
LOS CAPITANCILLOS:
FRESHWATER WETLAND MITIGATION

Soil Test Pit Locations
(figure provided by SCVWD)

Los Capitancillos Wetland Mitigation Site



PT = Test Pit
B = Boring

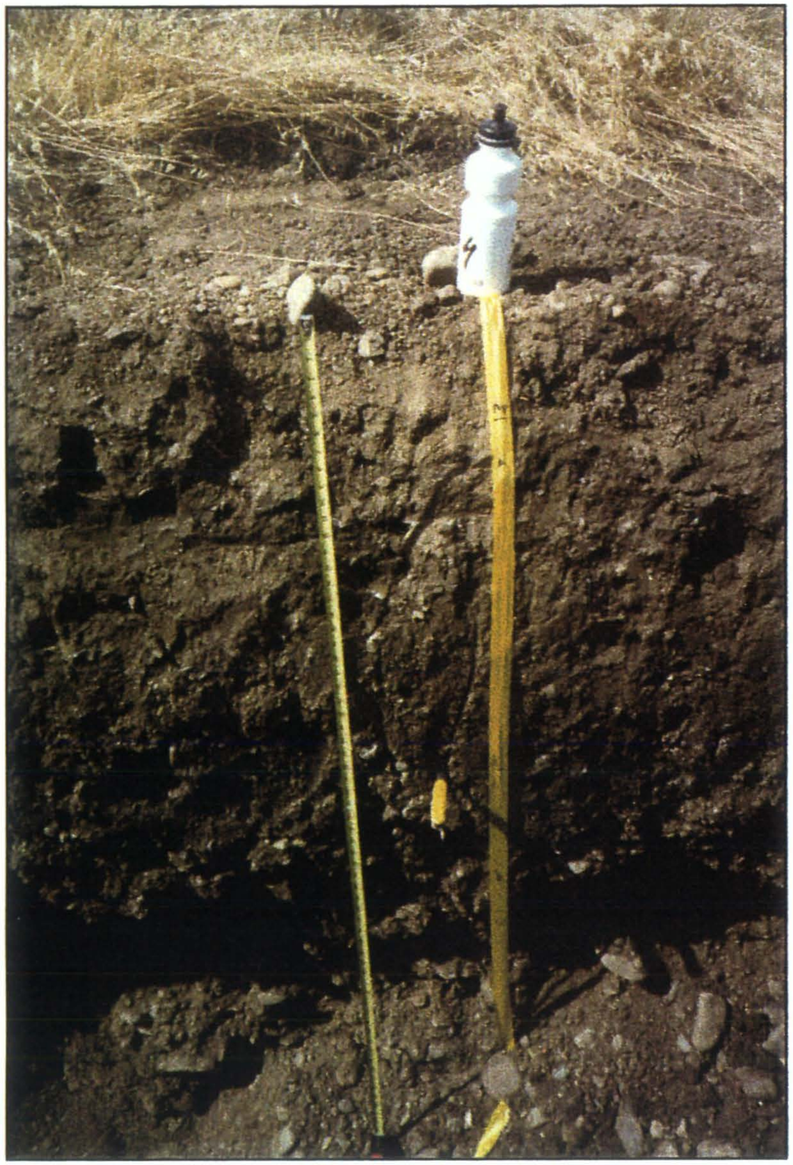


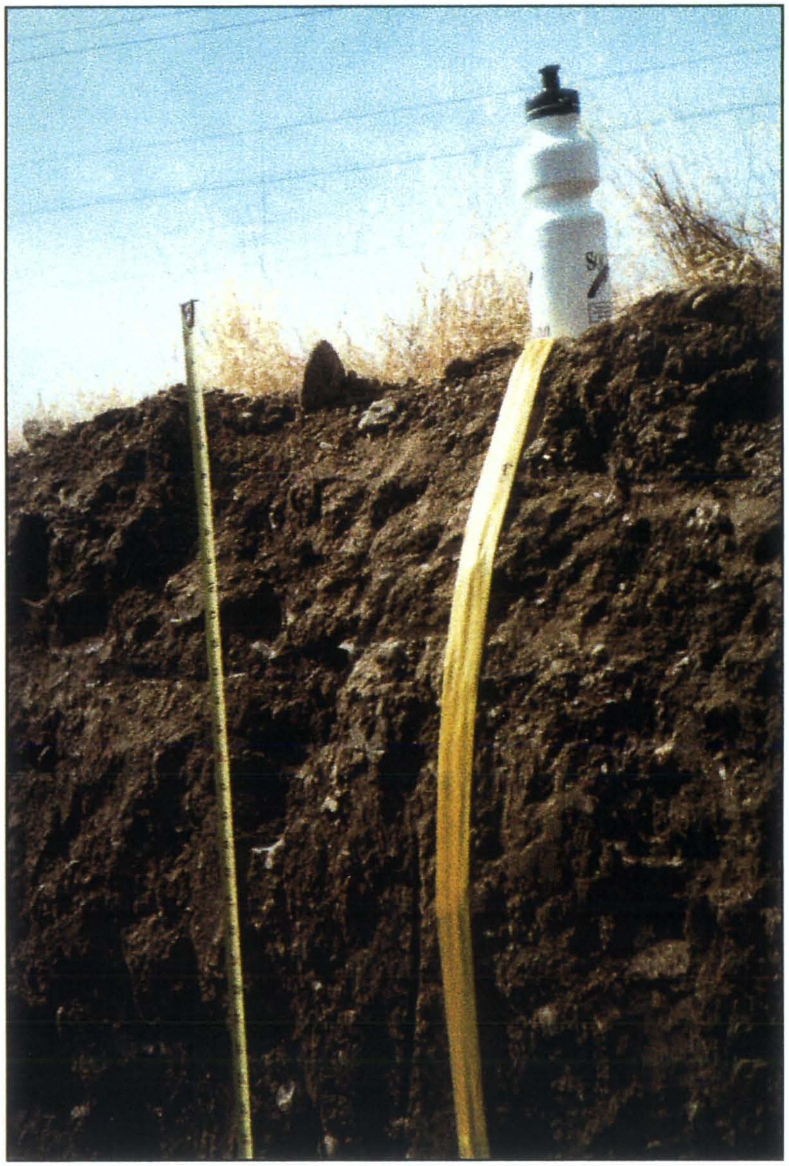
Santa Clara Valley Water District

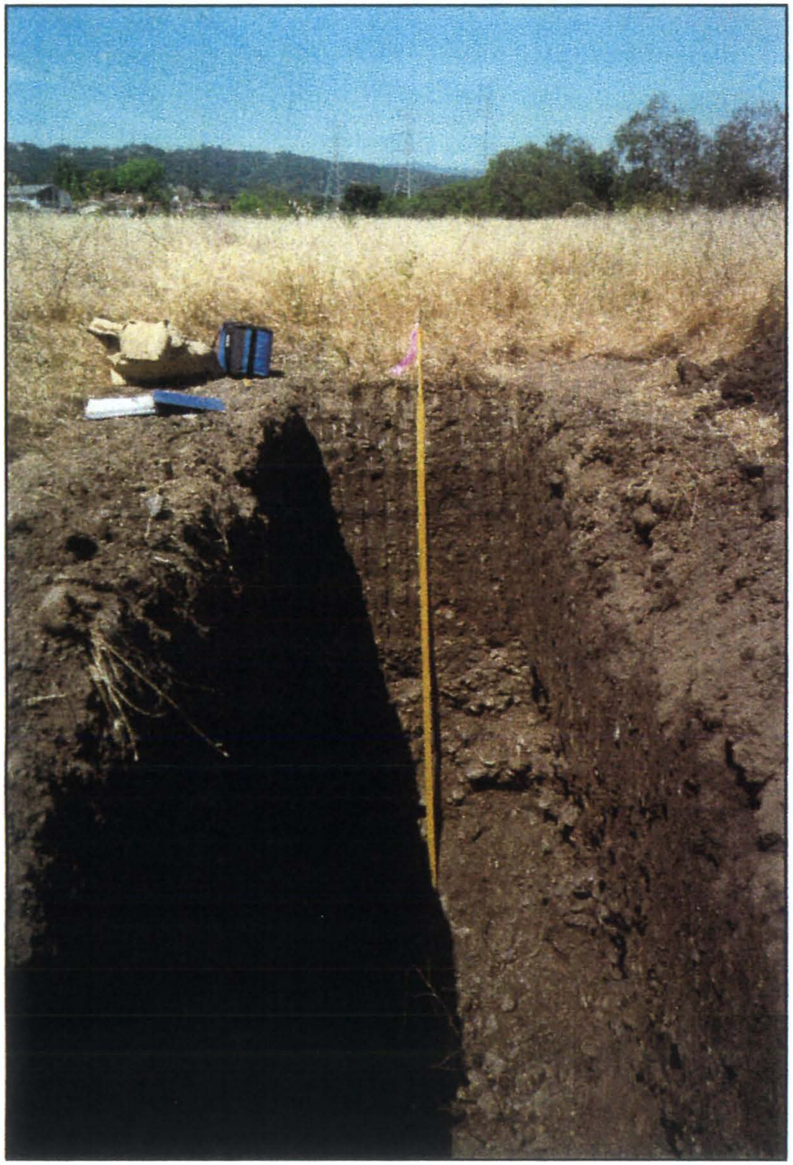
APPENDIX C

LOS CAPITANCILLOS:
FRESHWATER WETLAND MITIGATION

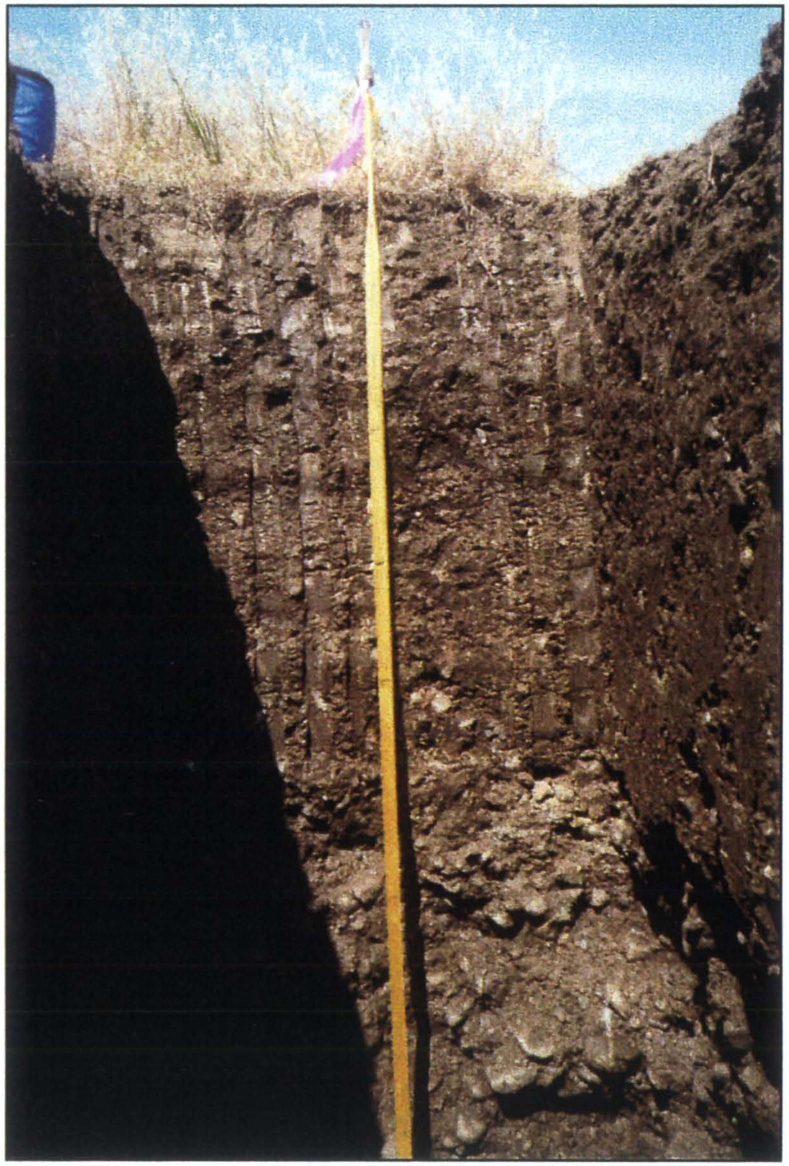
Soil Test Pits Photographs


Soil Sample Pit 1

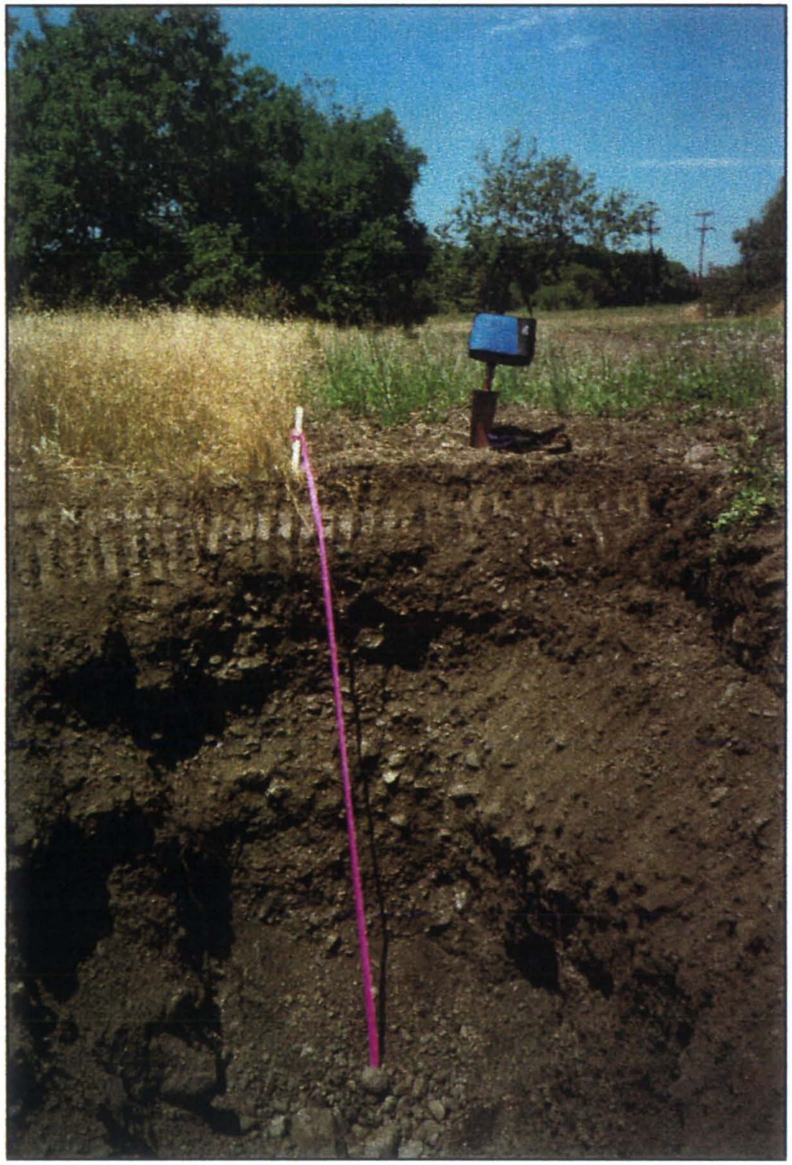

Soil Sample Pit 1



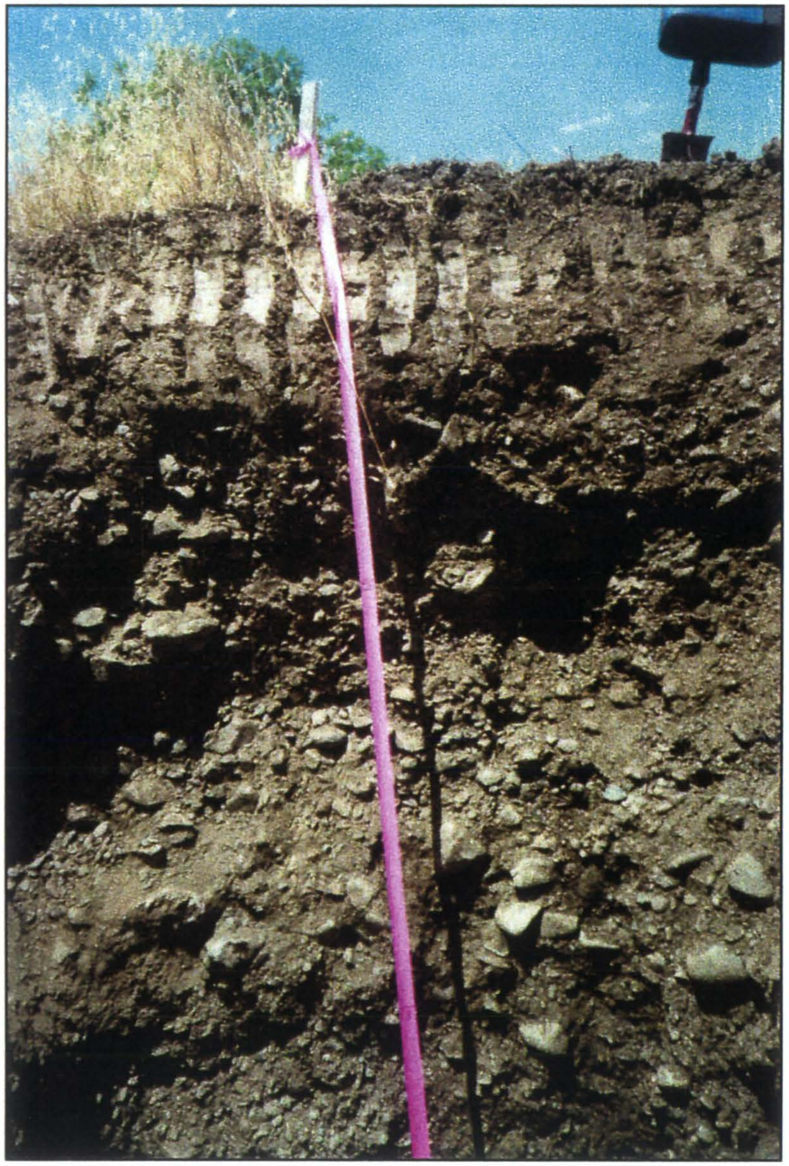
Soil Sample Pit 2



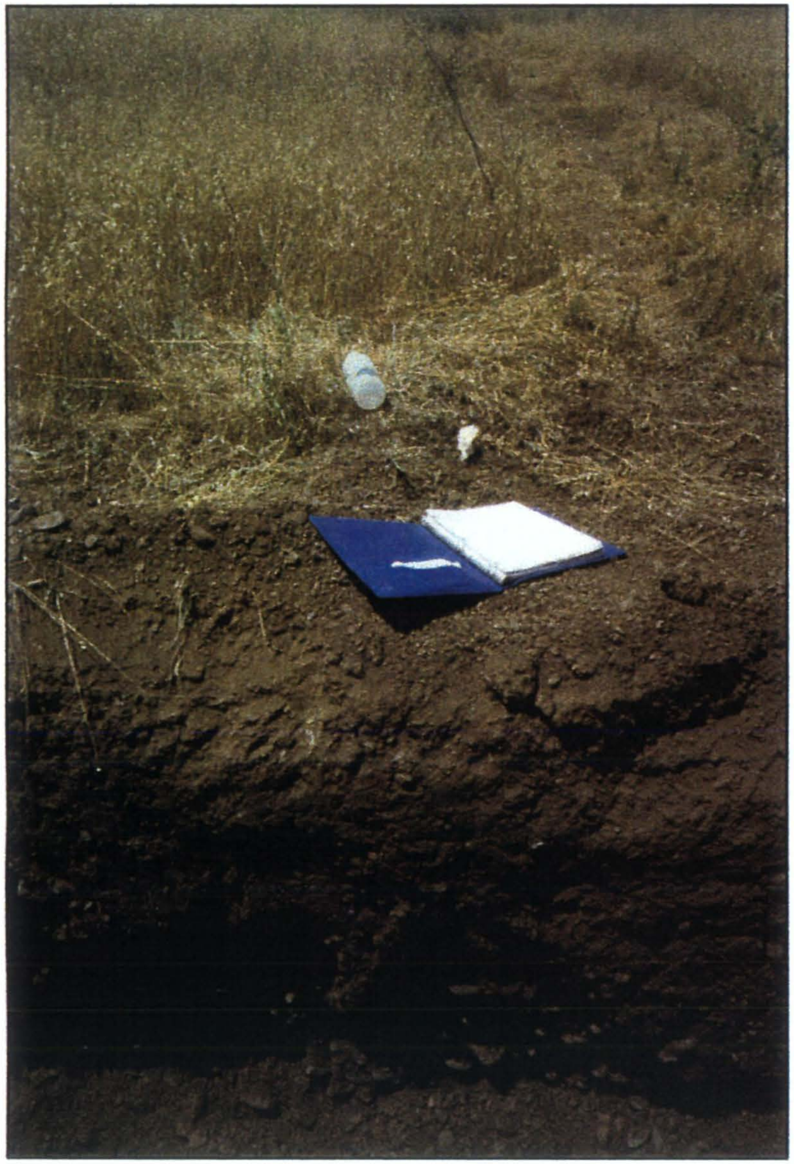
Soil Sample Pit 2



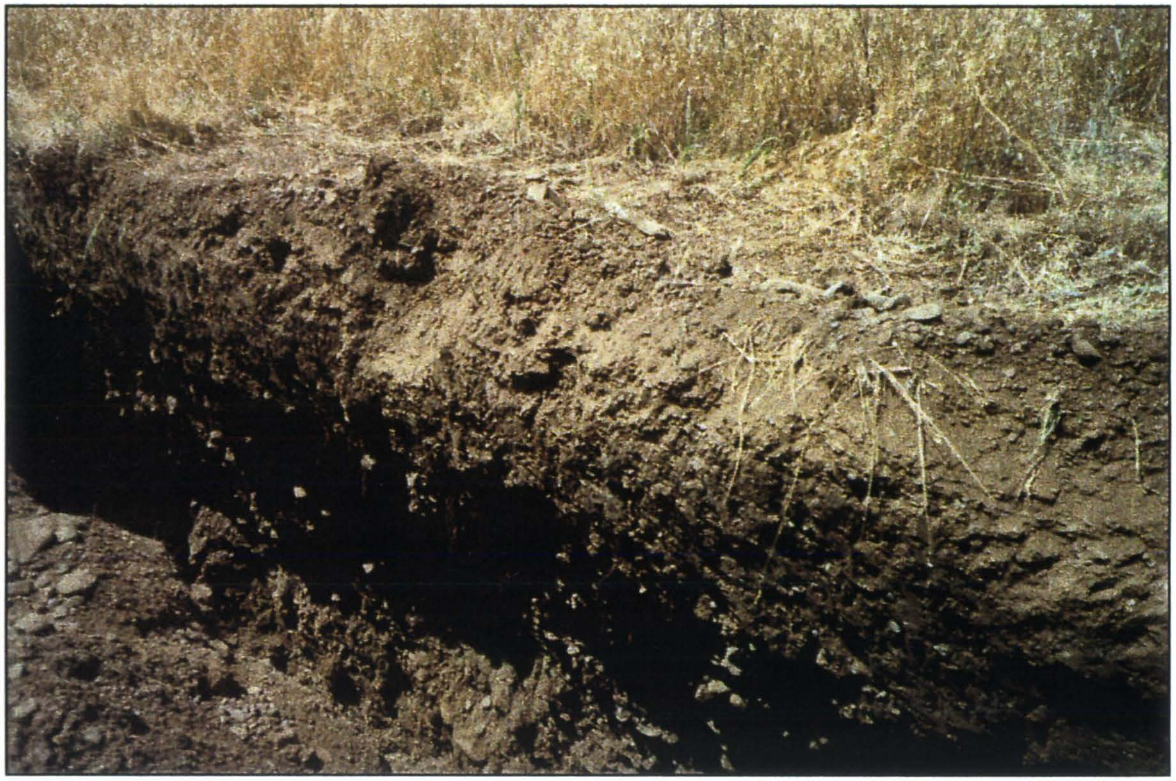
Soil Sample Pit 3



Soil Sample Pit 3



Soil Sample Pit 4



Soil Sample Pit 4

APPENDIX D

LOS CAPITANCILLOS: FRESHWATER WETLAND MITIGATION

Soil Test Pits Technical Description Forms

SOIL TEST PITS TECHNICAL DESCRIPTION FORM

PT-1

PROJECT SITE: LOS CAPITANCILLOS 1700-01
INVESTIGATOR(S): PATRICK B – PAT R
DATE: 5-25-00
SAMPLE IDENTIFICATION NUMBER: PIT 1, WEST EDGE OF SITE 120 E OF TOP OF BANK
SCS SOIL SERIES/PHASE: Y/A YOLO SILTY CLAY LOAM 0-2% – SURFACE SILTY CLAY LOAM OR CL
SOIL TAXONOMY: TYPIC XERORTHENT — entisol
PLANT COMMUNITY: RUDERAL –
HISTORICAL/CURRENT LAND USE: FLOOD PLAIN – ORCHARD
SURFACE HYDROLOGIC CHARACTERISTICS: NO SURFACE C/T
SURFACE TOPOGRAPHIC FEATURES: FLAT
NOTES:

SURFACE EVIDENCE OF LOCALIZED FILL INCLUDING CONCRETE, BRICK, ASPHALT, SOME GLASS

DOMINATED BY *AVENA & CONVOLVULUS – HORDEUM –
Centaurea – Brassica – Raphanus – Erodium – Bromus diandrus – Rumex – P. OAK

– excavated to 86"
– ORGANIC MATTER restricted PRIMARILY to Ap
Ap – evidence of disking – dense worm holes

PROFILE CHARACTERIZATION

Horizon (defined by color, texture, etc.)	Depth (inches)	Textural Class	Soil Color (Munsell)	Coarse Materials Type/% (sand, gravels, stones)	Roots (abundance, size)	Redoxymorphic Features (color, %)	Profile Sketch
Ap	1			G(¼; <5%); S(1"<1%)	Few · Small	none	Fine Texture
GRANULAR	2	SILT CLAY	7.5YR3/2				
	4	LOAM	7.5YR3/2				
	7				NONE		
7	10	SILT CLAY	10YR2/2	MASSIVE			MASSIVE
A1	16	S LOAM	7.5YR3/2				
	22		7.5YR3/2				
29	29	STONY SILT					
C1	43	LOAM					
43		STONY GRAVELLY					LOOSE
C2 67	67	LOAM	7.5YR4/4	G¼; ST TO 12"		NONE	SEDIMENT?
C3		STRATIFIED SANDS + GRAVELLY					
86	86	ST + GR		GRAVELS ½+ S-12"			

Master Horizons and Layers Nomenclature:

O-horizon ; dominated by organic matter, undecomposed or partially decomposed litter

A-horizon ; found at surface or below an O-horizon and either has an accumulation of humified O/M or has properties resulting from cultivation or similar disturbance.; generally darker in color; older taxonomy has it as A1

E-horizon ; primary feature is loss of silicate clay, iron and aluminum; generally lighter in color than underlying B-horizon
it is differentiated from the A-horizon by being lighter in color and containing less O/M
it is differentieated from the B-horizon by color of higher value or low chroma or both or coarser texture; A2 in older taxonomy

B-horizon: generally has illuvial concentration of clay, iron, humus, etc. ; generally lower value/higher chroma

C-horizon : generally mineral layers little affected by pedogenic processes
included are sediments, unconsolidated bedrock, etc.

R-horizon ; hard bedrock

MODIFIERS: (t) indicates accumulation of silicate clay (e.g. Bt)
(g) indicates strong gleying
(p) indicates disturbance of layer from tillage or other mechanical means.
(y) indicates accumulation of gypsum (relatively insoluble)
(z) indicates accumulateion of salts (relatively soluble)

SECTIONS: subdivided as A1 (transitional to O), A2 (maximum development of features) or A3 (transitional to E) depending upon degree of accumulation of evidence

SOIL TEST PITS TECHNICAL DESCRIPTION FORM

PT-2

PROJECT SITE: LOS CAPITANCILLOS — 1700-01
INVESTIGATOR(S): PAT B - PAT R
DATE: 5-25-00
SAMPLE IDENTIFICATION NUMBER: S2 - SE PART OF SITE
SCS SOIL SERIES/PHASE: Same as S1
SOIL TAXONOMY:
PLANT COMMUNITY:
HISTORICAL/CURRENT LAND USE:
SURFACE HYDROLOGIC CHARACTERISTICS:
SURFACE TOPOGRAPHIC FEATURES: FLAT
NOTES:

- FEW CINNABAR STONES 12"+
- ORGANIC MATTER RELATED TO Ap ~ A1, relatively low

PROFILE CHARACTERIZATION

Horizon (defined by color, texture, etc.)	Depth (inches)	Textural Class	Soil Color (Munsell)	Coarse Materials Type/% (sand, gravels, stones)	Roots (abundance, size)	Redoxymorphic Features (color, %)	Profile Sketch
Ap	0 5	(STONY) SILT+CLAY LOAM	10YR 3/3	STONES 10% < 1 1/4"	few, small	none	GRANULAR CRUMBLY STICKY
A1 5 → 39		(STONY SILTY CLAY LOAM	10YR 3/2	STONES < 1" 15%	vf, s		MASSIVE STICKY
C1 39 → 57	39	STONY CLAY LOAM	10YR 3/3 10YR 3/4	STONES 1-4" 20% GRAVELS - 5%	none		SLIGHTLY STICKY LOOSE - SEDIMENTS
—	57	—	—	—			
C2 57 → 71		STRAT'S S-G-S	10YR 3/4				NON-STICKY STRATIFIED SANDS GRAVELS + STONES
C3 71	71 86		10YR 3/4	STONES 2"-24" 50% S+G 80%			

Master Horizons and Layers Nomenclature:

O-horizon ; dominated by organic matter, undecomposed or partially decomposed litter

A-horizon ; found at surface or below an O-horizon and either has an accumulation of humified O/M or has properties resulting from cultivation or similar disturbance.; generally darker in color; older taxonomy has it as A1

E-horizon ; primary feature is loss of silicate clay, iron and aluminum; generally lighter in color than underlying B-horizon it is differentiated from the A-horizon by being lighter in color and containing less O/M it is differentieated from the B-horizon by color of higher value or low chroma or both or coarser texture; A2 in older taxonomy

B-horizon: generally has illuvial concentration of clay, iron, humus, etc. ; generally lower value/higher chroma

C-horizon : generally mineral layers little affected by pedogenic processes included are sediments, unconsolidated bedrock, etc.

R-horizon ; hard bedrock

MODIFIERS: (t) indicates accumulation of silicate clay (e.g. Bt)
(g) indicates strong gleying
(p) indicates disturbance of layer from tillage or other mechanical means.
(y) indicates accumulation of gypsum (relatively insoluble)
(z) indicates accumulateion of salts (relatively soluble)

SECTIONS: subdivided as A1 (transitional to O), A2 (maximum development of features) or A3 (transitional to E) depending upon degree of accumulation of evidence

PT-3

SOIL TEST PITS TECHNICAL DESCRIPTION FORM

PROJECT SITE: LOS CAPITANCILLOS
INVESTIGATOR(S): [illegible]
DATE: 5-25-00
SAMPLE IDENTIFICATION NUMBER: S-3, NE CORNER
SCS SOIL SERIES/PHASE: S1
SOIL TAXONOMY:
PLANT COMMUNITY:
HISTORICAL/CURRENT LAND USE:
SURFACE HYDROLOGIC CHARACTERISTICS: None
SURFACE TOPOGRAPHIC FEATURES: - flat ~0% slope
NOTES:
→ ROOTS OF SYCAMORE FOUND AT 54"; TREE ~100ft TO North
— O/M in Ap horizon
* A horizons very shallow
- Stones at surface locally
* MOIST FROM 36" DOWN
~ NO O-horizon

PROFILE CHARACTERIZATION

Horizon (defined by color, texture, etc.)	Depth (inches)	Textural Class	Soil Color (Munsell)	Coarse Materials Type/% (sand, gravels, stones)	Roots (abundance, size)	Redoxymorphic Features (color, %)	Profile Sketch
Ap	0–4"	(stony) silty clay loam	7.5-YR 3/3	Stones 1/4" <5%	few, small	none	0 Ap somewhat STICKY 4
A1	4"–13"	(stony) silty clay loam	7.5 YR 3/2	Stones <1" <5%	f, small		A1 sticky 13
C1	13"–29"	sandy loam	7.5 YR 3/2		f, med.		C1 non-sticky 29
C2	29"–56"	stratified sands	7.5 YR 3/4	Sand 10% G 20 Stones 1–6" 70	few, med		stratified sand C2 gravel + stones 56
C3	56"–108"	stratified &		Gravel 1/4" 50 Stones 1–11" 50			C3 stratified gravel & stone 108"

Master Horizons and Layers Nomenclature:

O-horizon ; dominated by organic matter, undecomposed or partially decomposed litter

A-horizon ; found at surface or below an O-horizon and either has an accumulation of humified O/M
or has properties resulting from cultivation or similar disturbance.; generally darker in color; older taxonomy has it as A1

E-horizon ; primary feature is loss of silicate clay, iron and aluminum; generally lighter in color than underlying B-horizon
it is differentiated from the A-horizon by being lighter in color and containing less O/M
it is differentieated from the B-horizon by color of higher value or low chroma or both or coarser texture; A2 in older taxonomy

B-horizon: generally has illuvial concentration of clay, iron, humus, etc. ; generally lower value/higher chroma

C-horizon : generally mineral layers little affected by pedogenic processes
included are sediments, unconsolidated bedrock, etc.

R-horizon ; hard bedrock

MODIFIERS: (t) indicates accumulation of silicate clay (e.g. Bt)
(g) indicates strong gleying
(p) indicates disturbance of layer from tillage or other mechanical means.
(y) indicates accumulation of gypsum (relatively insoluble)
(z) indicates accumulateion of salts (relatively soluble)

SECTIONS: subdivided as A1 (transitional to O), A2 (maximum development of features) or A3 (transitional to E)
depending upon degree of accumulation of evidence

SOIL TEST PITS TECHNICAL DESCRIPTION FORM

PT-4

PROJECT SITE: LAS CASTANACILLAS
INVESTIGATOR(S): PAT B
DATE: 5-25-00
SAMPLE IDENTIFICATION NUMBER: S-4, CENTER
SCS SOIL SERIES/PHASE:
SOIL TAXONOMY: See S1
PLANT COMMUNITY:
HISTORICAL/CURRENT LAND USE:
SURFACE HYDROLOGIC CHARACTERISTICS: NONE
SURFACE TOPOGRAPHIC FEATURES: FLAT
NOTES:

-ORGANIC MATTER LOW AND RESTRICTED TO Ap

Ap + A1 - clay loam?

PROFILE CHARACTERIZATION

Horizon (defined by color, texture, etc.)	Depth (inches)	Textural Class	Soil Color (Munsell)	Coarse Materials Type/% (sand, gravels, stones)	Roots (abundance, size)	Redoxymorphic Features (color, %)	Profile Sketch
Ap	0 -6"	Stony silty loam	10YR 3/3	Stones 5%	few fine	none	0 Ap 8"
A1	-25	Stony silty loam	10YR 3/3 10YR 3/4	Stones ~10%			A1 25"
C1	-45	stony silty loam	10YR 3/3	Stone Sand - 30 Stone - 1/2-2" 30 6-			C1 45"
C2	-98	Stratified gravel + stone	10YR 3/3	Stones 1"-12" 80 Gravel 80			C2 98"

Master Horizons and Layers Nomenclature:

O-horizon ; dominated by organic matter, undecomposed or partially decomposed litter

A-horizon ; found at surface or below an O-horizon and either has an accumulation of humified O/M or has properties resulting from cultivation or similar disturbance.; generally darker in color; older taxonomy has it as A1

E-horizon ; primary feature is loss of silicate clay, iron and aluminum; generally lighter in color than underlying B-horizon it is differentiated from the A-horizon by being lighter in color and containing less O/M it is differentieated from the B-horizon by color of higher value or low chroma or both or coarser texture; A2 in older taxonomy

B-horizon: generally has illuvial concentration of clay, iron, humus, etc. ; generally lower value/higher chroma

C-horizon : generally mineral layers little affected by pedogenic processes included are sediments, unconsolidated bedrock, etc.

R-horizon ; hard bedrock

MODIFIERS: (t) indicates accumulation of silicate clay (e.g. Bt)
(g) indicates strong gleying
(p) indicates disturbance of layer from tillage or other mechanical means.
(y) indicates accumulation of gypsum (relatively insoluble)
(z) indicates accumulateion of salts (relatively soluble)

SECTIONS: subdivided as A1 (transitional to O), A2 (maximum development of features) or A3 (transitional to E) depending upon degree of accumulation of evidence

APPENDIX E

LOS CAPITANCILLOS:
FREHWATER WETLAND MITIGATION

Soil Laboratory Analysis

Soil and Plant Laboratory, Inc.

www.soilandplantlaboratory.com

352 Mathew Street
Santa Clara, CA 95050
408-727-0330 phone
408-727-5125 fax

SANTA CLARA OFFICE
June 7, 2000
Lab. No.

H. T. HARVEY & ASSOCIATES
3150 Almaden Expressway, Suite 145
San Jose, CA 95118

Attn: Max Busnardo

Re: LOS CAPITANCILLOS

Data only is provided, as requested. Sample descriptions appear at the right on the enclosed data sheet. Please call if you would like assistance utilizing the data.

Rock Percentage Results

Sample #	Description	½ to 1-inch rock (Volume %)	1-inch or larger rock
21	4 to 24-in depth	4.4%	None
22	4 to 6-foot depth	12.5%	37.5%*

* If all rock over ½-inch is considered, the total amount of rock in this sample is 50%.

Jeff Lutton

JEFF LUTTON

Fax 2 pages and mail.

jl

Soil and Plant Laboratory, Inc.

P.O. Box 6566, Orange, California 92613-6566/(714) 282-8777/FAX (714) 282-8575
P.O. Box 153, Santa Clara, California 95052-0153/(408) 727-0330/FAX (408) 727-5125
P.O. Box 1648, Bellevue, Washington 98009-1648/(425) 746-6665/FAX (425) 562-9531

H T HARVEY & ASSOCIATES
3150 Almaden Expressway, Suite 145
San Jose, CA 95118
Attention: Max Busmardo

SOIL FERTILITY AND MICRONUTRIENT ANALYSIS
(A01 or A17)

Santa Clara Office
Lab No. 22729
LOS CAPITANCILLOS
1700-01

Samples Taken: Samples Rec'd: 5/26/00

Data reviewed by ______________________. Recommendations available upon request.

Sam ple #	Half Sat%/ TEC	pH/ Qual Lime	ECe	Parts Per Million Parts Dry Soil NO3 N	NH4 N	PO4 P	K	Ca	Mg	Cu	Zn	Mn	Fe	Sat Ext B ppm	Na eSAR	Sample Description & Log Number
21	18	6.6	0.5	4	6	29	160	2100	1030	2.2	1	19	38	0.05	1.1	4in.-24in. Depth
	194	None		0.3		1.4	0.8	0.8	3.2	0.7	0.1	1.1	0.5	0.2	0.8	0.7800-A13807 20 4
22	10	6.8	0.5	3	3	14	50	1240	724	1.1	1	6	15	0.06	1.2	4-6 Foot Depth
	124	None		0.3		1.1	0.5	0.9	3.8	0.6	0.2	0.6	0.3	0.2	1.0	0.7100-A13808 20 4

6/ 7/00

Sufficiency factor (1.0=sufficient for average crop) below each nutrient element. N factor based on 200 ppm constant feed. Half Saturation %=approx field moisture capacity. B, Na and salinity(ECe (dS/m at 25 deg.C.)) by sat ext method. Major elements by sodium chloride extraction (phosphorus by sodium bicarbonate extraction). Cu, Zn, Mn & Fe by DTPA extraction. eSAR=Est. Sodiu adsorption ratio. Na=Sodium (meq/l). TEC (listed below Half Sat. when requested)=Estimated Total Exchangeable Cations (meq/kg)

Sam ple #	Organic Percentage	Percent of Sample Passing 2 mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
21		8.5	7.8	3.5	4.7	33.6	30.3	27.9	Very Gravelly Loam SO4 = 2.1 meq/l Chem Org = 1.7 % dry wt
22		16.9	20.0	21.0	20.6	32.2	13.3	12.9	Very Gravelly Sandy Loam SO4 = 1.9 meq/l Chem Org = 0.4 % dry wt

6/ 7/00

Half Saturation %=approximate field moisture capacity. Salinity = ECe(dS/m at 25 degree C). Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm (1/2 inch) sieve. Particle sizes in millimeters.